

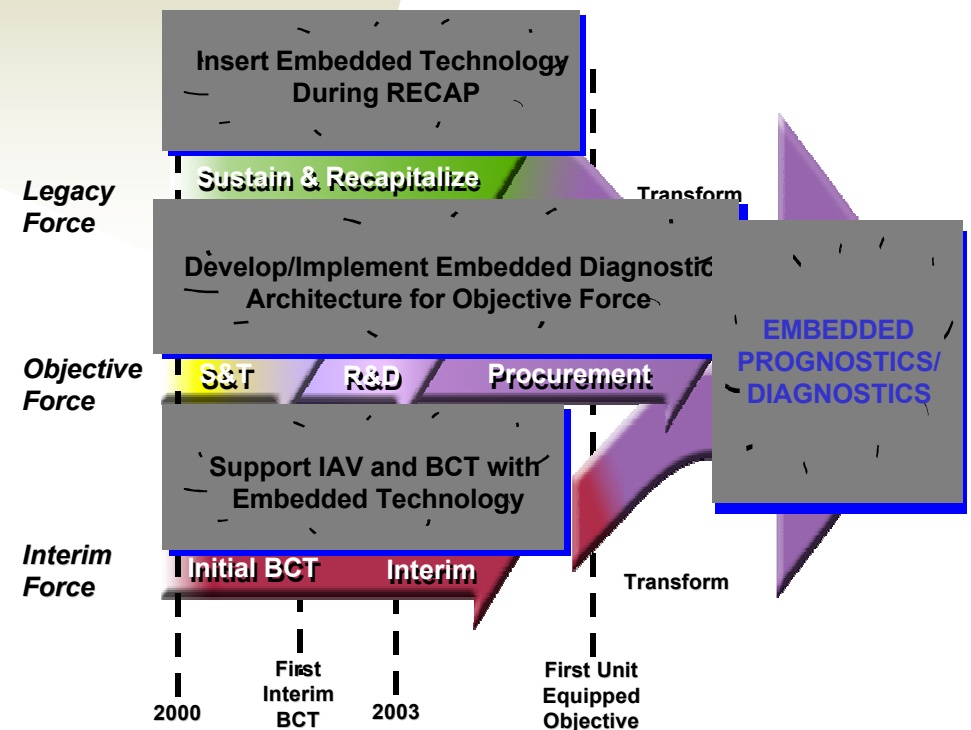
Army Diagnostics Improvement Program (ADIP)

**“In general, our logistical footprints for deployed forces are unacceptably large...”
“...we must develop a vibrant capability for reach back communications and intelligence so that we can begin to aggressively reduce the size of our deployed support footprints - - both combat support and combat service support.”**

General Eric K. Shinseki

**Update for MTSSG
26 Jul 01**

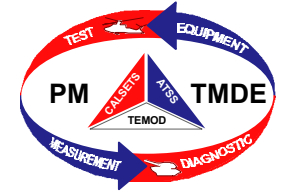
**LTC Carol Young
Office of the Product Manager
Test, Measurement, and
Diagnostic Equipment**



ADIP = ↓ Log Burden + ↑ Readiness



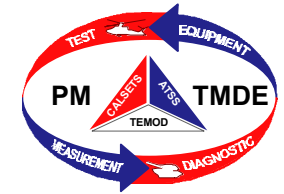
Topics



- **History**
- **Status**
 - Ground
 - Air
- **Schedule**
- **Funding**
- **Summary**



Background



➤ Problems - CSA (GEN Reimer)



- Too Many Misdiagnoses
- Too Many No Evidence of Failures (NEOFs)
- Too Labor Intensive
- Lagging Behind Commercial Industry
- No Army Strategy for Improvement

➤ Solution – ★ ★ ★

Mil Dep ASA (ALT)

Dep AMC

DCSLOG

GOSC

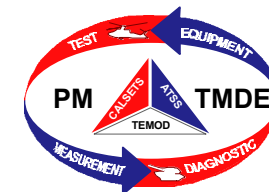
PM TMDE

8 July 97:

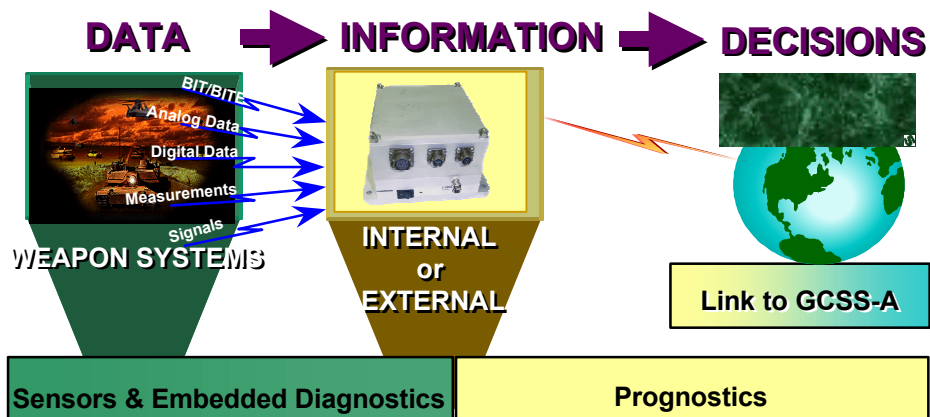
“...develop, test and emplace embedded diagnostics in Army equipment.”



Army Diagnostics Improvement Program (ADIP)



Diagnostics Information Flow



Program Description

Objective: Provide an embedded diagnostic/prognostic capability that reduces total ownership cost while simultaneously improving readiness

Strategy to obtain objective:

1. Develop HTI solution for legacy platforms
2. Work with recapitalization system PMs to incorporate embedded diagnostics/prognostics
3. Assist PMs with embedding diagnostics/prognostics for new platforms

SCHEDULE

	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
PROGRAM MILESTONES	MS C (Grd)▲ ▲ MS C (Air) / UH-60M								
TEST	▲ TT ▲ UA ▲ TT □ UA								
PRODUCTION	116/129116/129 116/129 460/480 460/480 460/480 460/480 460/480 460/480 - EDS/EAS XX XX XX XX XX XX - HUMS (UFR)								
DEPLOYMENT	Selected Platforms { 1st 2nd 3rd BCT 4th 5th 6th IAV FMTV HEMMT UH60L AH-64A HUMS TARGETED RECAP SYSTEMS								
DEVELOPMENT	HW / SW MATURATION / TECHNOLOGY INFUSION								

STATUS: Execution Phase

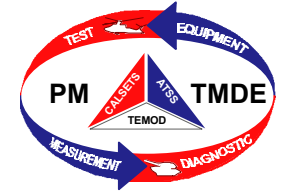
• Diagnostic Appliqué & Predictive Maintenance Module (PMM) for Air/Surface

- Presently in Milestone B phase
- Test beds at FT Riley & SC ARNG
- Going into Army Evaluation Command (AEC) conducted testing
- Working towards Milestone C & materiel release

• Providing diagnostic improvement for RECAP, BCT & new systems



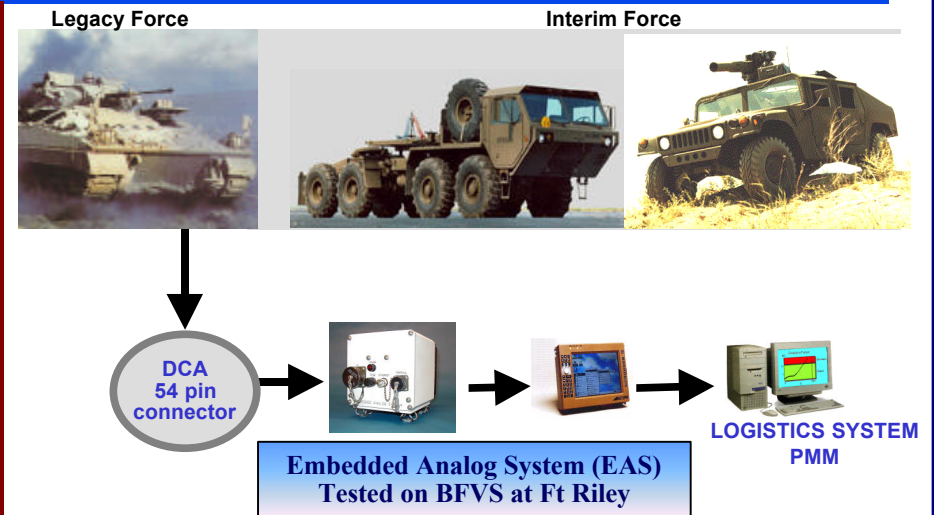
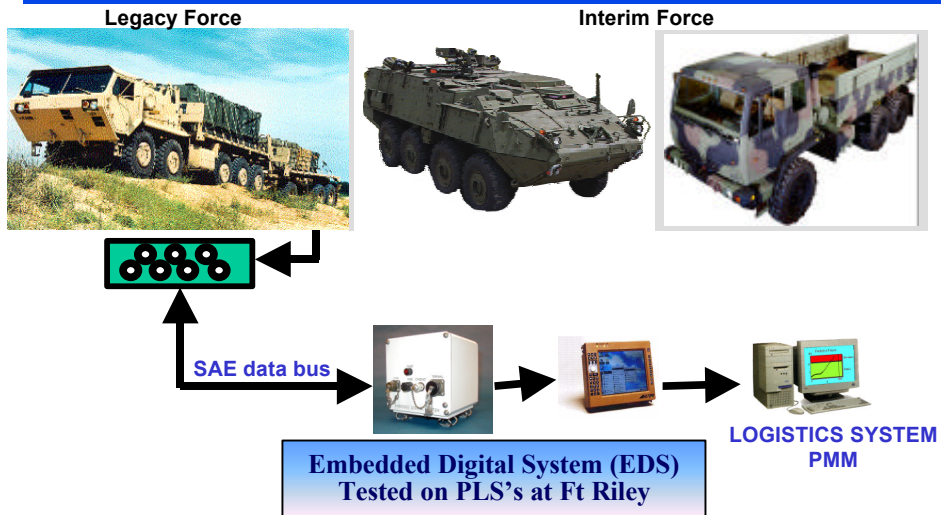
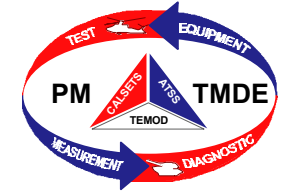
Ground Embedded Diagnostics/Prognostics Solution







- **Two Appliqué Boxes**
 - Embedded Digital System (EDS)
 - Embedded Analog System (EAS)
- **Fort Riley Is Ground Test Bed**
 - Palletized Loading System (PLS)
 - Bradley Fighting Vehicle System (BFVS)
- **Interim Force**
 - Interim Armored Vehicle (IAV)
 - Family of Medium Tactical Vehicles (FMTV)
 - Heavy Expanded Mobility Tactical Truck (HEMTT)
 - High Mobility Multipurpose Wheeled Vehicle (HMMWV)



Embedded Digital & Analog Systems (EDS/EAS)



SCHEDULE

	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
PROGRAM MILESTONES	MS C (Grd)   Contract Award								
TEST GROUND	 TT  UA								
PRODUCTION* - EDS/EAS	116/129116/129 116/129 460/480 460/480 460/480 460/480 460/480								
DEPLOYMENT	<div><div>Selected Platforms</div><div><div>1st2nd3rd BCT4th5th6th</div><div>IAV FMTV HEMMT</div></div><div>TARGETED RECAP SYSTEMS</div></div>								
DEVELOPMENT	HW / SW MATURATION and TECHNOLOGY INFUSION								

(*Minimum Quantities)

STATUS: Execution Phase

Jul 2001; Technical testing

Aug 2001; Army Evaluation Command (AEC) User Assessment, total of 16 vehicles with 6 types of vehicles (BFVS, PLS, HEMTT, M915, M916 & HMMWV)

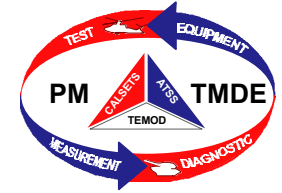
Nov 2001; Additional installations in 6 Paladins, 6 FAAS-V, 14 HEMTT, and up to 8 FMTV at Ft Riley and up to 16 IAVs at contractor plant

Mar 2002; Milestone (MS) C review and Contract Award

Oct 2002; Materiel Release and FUE (BCT)



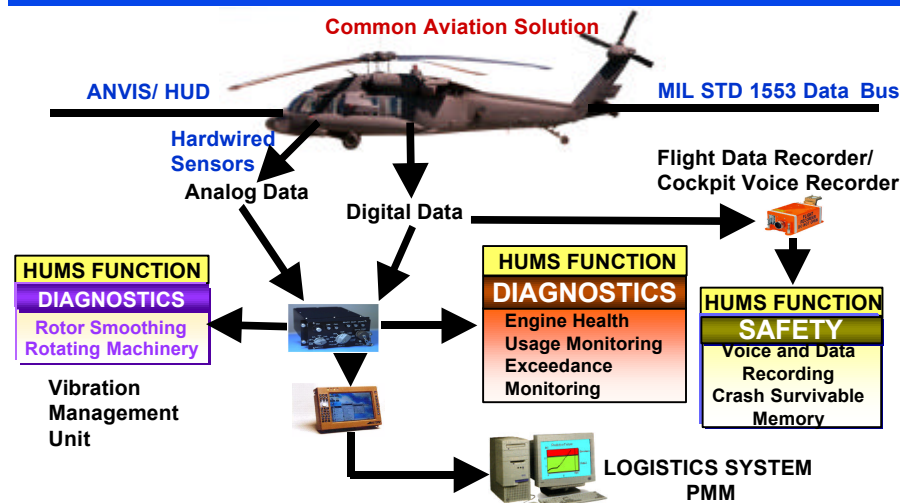
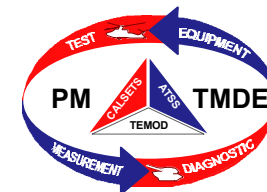
Health & Usage Monitoring System (HUMS)



- **Common Aviation Solution**
- **Full HUMS Includes**
 - Embedded Diagnostics/Prognostics (Rotor Track Smoothing, Drive Train Diagnostics & Engine Health, Performance & Exceedance Monitoring)
 - Safety (Flight Data Recorder & Cockpit Voice Recorder)
- **South Carolina Army National Guard (SCARNG) Is Test Bed**
 - UH-60L Blackhawk
 - AH-64A APACHE
 - AH-64D APACHE (Fort Rucker)



Health & Usage Monitoring System (HUMS) Blackhawk



UH-60L BLACKHAWK



**Vibration
Management
Unit Installed
16 Jan 2001**

By end of FY 02
ARNG will have
24 systems
Flying in UH-60Ls

SCHEDULE

	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
PROGRAM MILESTONES	Δ MS C (Air) / UH-60M								
TEST - AIR	Δ TT □ UA								
PRODUCTION - HUMS (UFR)				XX	XX	XX	XX	XX	XX
DEPLOYMENT	<div>UH60L</div> <div>HUMS</div>								
DEVELOPMENT	HW / SW MATURATION & TECHNOLOGY INFUSION								

STATUS: Execution Phase

Jul - Nov 2001; Technical Testing

Feb - May 2002; AEC User Assessment
(4 UH-60L SC ARNG)

Jun - Aug 2002; Additional UH-60L's
(4 SC ARNG & 8 NC ARNG)

Nov 2002; MS C Review & DA Blackhawk RECAP Decision

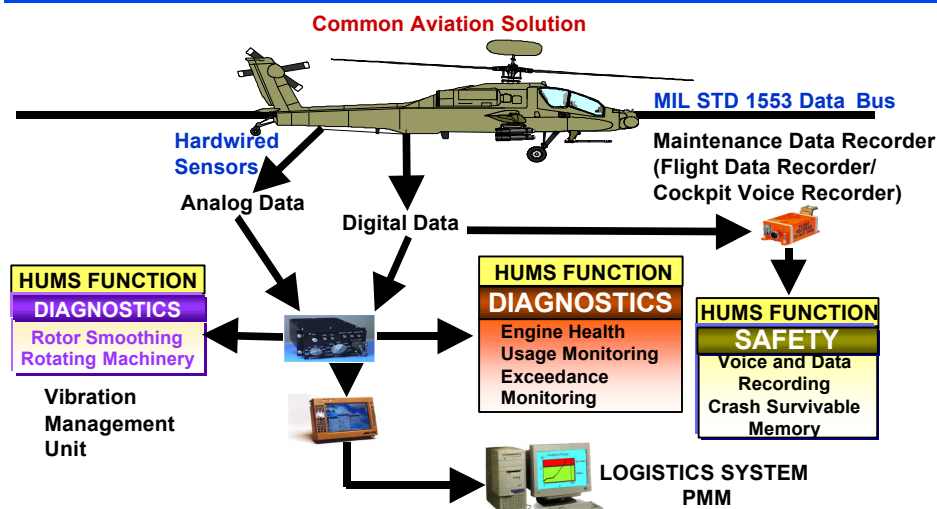
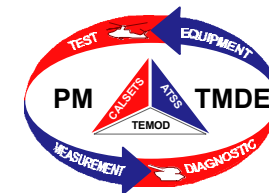
Dec 2002; Contract Award

May - Jun 2003; 8 Additional UH-60L's FL ARNG

Jul 2003; Materiel Release and Additional Aircraft as
Funding Permits



Health & Usage Monitoring System (HUMS) APACHE



AH-64A APACHE

By the end of FY 02,
ARNG will have
127 systems
Flying in AH-64As

**Vibration
Management Unit**

SCHEDULE

	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
PROGRAM MILESTONES		△ AH-64D Production Decision △ AH-64A Production Decision							
TEST - AIR		△ TT □ UA							
PRODUCTION - HUMS (UFR)				XX	XX	XX	XX	XX	XX
DEPLOYMENT				AH-64A	HUMS				
DEVELOPMENT				HW / SW MATURATION & TECHNOLOGY INFUSION					

STATUS: Execution Phase

AH-64D

Jul - Nov 2001; Technical testing

Nov 2001 - May 2002; Assessment/analysis

May 2002; Production decision for Lot 8 and ECP others

AH-64A

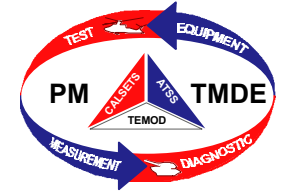
Apr - Jun 2002; Technical testing

Jul - Oct 2002; User Assessment

Jul 2003; Additional Aircraft as funding permits



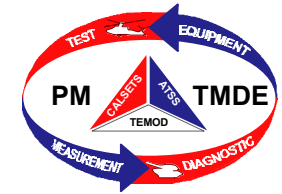
Predictive Maintenance Module (PMM)



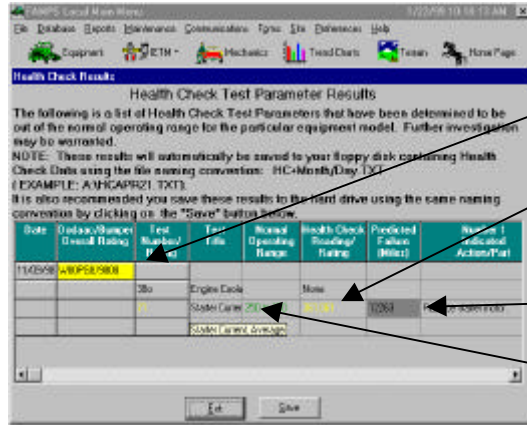
- **Key Maintenance Enabler**
- **Functionality Same On Ground & Air**
- **Links Combat Systems & Maintainers to Logistics Systems**
- **Prognostics Capability**



Ground & Air Predictive Maintenance Module (PMM)



Ground PMM Screen View



Vehicle Status Amber Rating

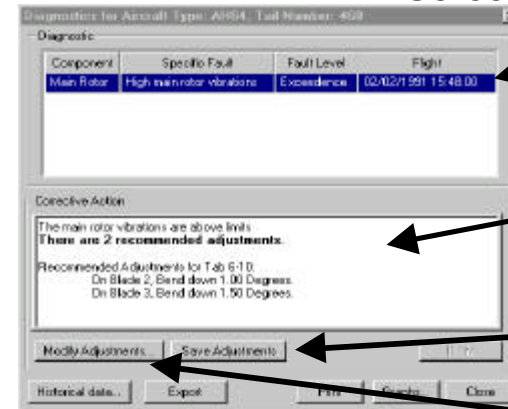
Health Check Test Result

Predict When Failure Will Occur

Anticipate What Will Fail

Operational in 3rd BDE, 1st AD

Air PMM Screen View



Each Fault listed in order of severity

Follow the recommended corrective actions

Save adjustments; records moves - Helps us learn and improve routines

User can Modify Adjustments

Operational in SCARNG

SCHEDULE

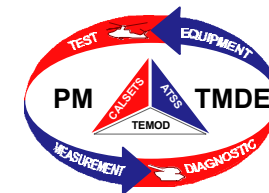
	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
PROGRAM MILESTONES	MS C (Grd) MS C / UH-60L (Air)								
TEST	TT UA TT UA								
PRODUCTION	116/129 116/129 116/129 460/480 460/480 460/480 460/480 460/480 460/480 - EDS/EAS - HUMS (UFR)								
DEPLOYMENT	Selected Platforms: 1st 2nd 3rd BCT 4th 5th 6th IAV FMTV HEMMT UH60L AH-64A HUMS TARGETED RECAP SYSTEMS								
DEVELOPMENT	HW / SW MATURATION & TECHNOLOGY INFUSION								

STATUS: Execution Phase

- Jul 2001; Technical testing for Ground PMM
- Nov 2001; Technical testing for Air PMM AH64D & UH60L
- Apr – Jun 2002; Technical testing Air PMM AH64A
- Aug 2001; AEC User Assessment for Ground PMM
- Feb – May 2002; AEC User Assessment Air PMM on UH60L
- Milestone C review Mar 2002 Ground & Nov 2002 Air



ADIP FUNDING (\$K) MDEP FL8R, BOS HTI



OPA3		01	02	03	04	05	06	07	08	09
N11109	EMBEDDED DIA	0	1207	1209	1210	5045	5051	5056	5000	5000
6.5 RDTE										
L66	EMBEDDED DIA/PROG	6368	7032	7354	7705	5610	5231	5234	3500	3500



Summary

- Executing Leadership Guidance
- Materiel Developer With Two Approved ORDS
- Funded RDTE & Production
- Providing Diagnostic Improvement For RECAP, BCT & New Systems

$$ADIP = \downarrow \text{Log Burden} + \uparrow \text{Readiness}$$